User's Manual

For

MO-CON501

CNC Pendant Controller

Revision 1.0 (July 2009)

Attention: Please read this manual carefully before using the pendant controller

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1. CAUTION

- Do NOT use this product in a strong magnetic field
- Do NOT remove USB memory stick while running a programme
- Protect it from water, moisture, dust and heat
- Do NOT allow any liquid or other foreign body to get into the controller case
- Do NOT open the cover, there are no maintainable parts inside
- Be gentle when plugging in cables and USB memory stick

2. INTRODUCTIONS

2.1 Description

The MO-CON501 CNC Pendant Controller with built-in DSP (digital signal processor) reads G-code or PLT programs (text file) and supports most Fanuc post processing from a USB memory stick or its internal memory. The controller then converts it into output signals to the motor drives. It also provides digital outputs to control a spindle motor (up to 16 speeds).

The MO-CON501 also accepts inputs from up to 3 limit switches and can supply power to 3 proximity sensors. It has an input to allow automatic setting of the Z-axis (after tool changes).

MO-CON501 CNC Pendant Controller Kit includes:

* 1x MO-CON501 Pendant Controller
* 1x Connecting Board
* 1x SCSI cable
* 1x USB cable
* 1x 1GB memory stick

2.2 Main Features

- Totally independent from PC platform;
- Directly read files from USB memory stick;
- Easily process G-code or PLT file with a large size;
- Good system and process file examining function;
- Easy to update system programme;
- Support high microstep which makes precise and fast process possible;
- Support to run segments of a programme;
- Reliable data protection and recovery function

2.3 Technical Specifications

Contents	Specification	Contents	Specification
Working Temperature	0℃ to +70℃	**Humidity**	＜90％
Output Voltage	5VDC	**Power Consumption**	2W
Languages	English	**Dimensions**	156*110*38mm
Processor	160M DSP	**Axes**	3 axes
Display	LCD with 128 by 64 dot matrix, Back lit screen	**Communication Terminals**	USB terminal and USB memory stick
File Format	G code, PLT files (supports most Fanuc post processing)	**File Memory**	128Mb Internal Memory, it can support larger size files because it reads directly from a USB memory stick (up to 1GB)
Help Function	On screen help information and guide	**Drive System**	Step Motors or brushless motors (pulse & direction)
Operating Interface	Menu driven key pad	**Cutter Adjustment Function**	Yes (auto Z-axis set function)
Interpolation function	Polar and circular interpolation	**System Data Inspection Function**	Yes (report programme errors)
Spindle Control Function	Yes (16 combination binary out put)	**Processing Position Adjustment Function**	Yes (ability to adjust Z-axis when stationary)
Processing Data Inspection Function	Yes (display full program on screen)	**Stop Point Reprocessing Function**	Yes (programme resume)
Multi Working Coordinates	It has 10 working coordinates (origin points)	**Data protection when power off**	Yes (programme saves line number when power is cut to allow to continue from this line)
Copy Processing Function	Yes		

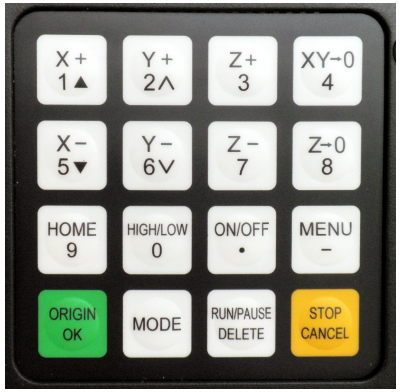
2.4 Connecting Board Wiring Diagrams

You need to connect the DSP board and the controller before starting running it properly. Please refer to the supportive PDF document "**MO-CON501 connecting Board Wiring Diagram**" for the details.

3. FUNCTIONS AND SETTINGS

MO-CON501 CNC pendant controller is a motion control system which changes motion data into related electronic signals which controls the movements of the 3 axes. This controller reads CNC programme from a USB Memory stick which makes it is easy to use.

3.1 Button Functions



Button	Function
X+ 1▲	Number "1" key + Positive movement of X axis + Menu scroll-up
Y+ 2∧	Number "2" key + Positive movement of Y axis + accelerate process speed + property selection in Menu
Z+ 3	Number "3" key + Positive movement of Z axis + increase spindle speed when running a programme (if set up)
XY→0 4	Number "4" key + zeroing of X and Y axis origin
X− 5▼	Number "5" key + Negative movement of X axis + Menu scroll-down
Y− 6∨	Number "6" key + Negative movement of Y axis + decelerate process speed + property selection in Menu
Z− 7	Number "7" key + Negative movement of Z axis, + decrease spindle speed when running a programme (if set up)
Z→0 8	Number "8" key + zeroing of Z axis origin
HOME 9	Number "9" key + move to Home
HIGH/LOW 0	Number "0" key select High or Low speed when moving manually
ON/OFF •	decimal point key + manual spindle start-up / stop
MENU −	Minus key + open menu , multi process state checking
ORIGIN OK	Move to origin (i.e. Y0 X0) + select from menu + confirm inputs
MODE	Mode this changes mode continues / distance / step, also displays speed /speed ratio / line number when programme is running
RUN/PAUSE DELETE	Select programme + pause when running + delete before entering new data
STOP CANCEL	High/low speed parameter adjustment + stop programme when running + exiting menu items + operating cancel

3.2 Compound Buttons

There are some compound buttons for special applications. To use these, press the first button and hold then press the second button, release the two buttons at the same time.

Their functions are as following:

Compound Button	Function
ORIGIN OK + STOP CANCEL	Help information
MENU − + X+ 1▲	Any number key, switch working co-ordinate (i.e. 1X, 1Y, 1Z to 9X, 9Y, 9Z)
RUN/PAUSE DELETE + Z+ 3	Any number key, stop point resume (start a programme from saved point)
RUN/PAUSE DELETE + HIGH/LOW 0	Keys to open the Advanced Process Menu
MENU − + ON/OFF •	Keys to activate the C.A.D function (**Cutter Adjust Device)**

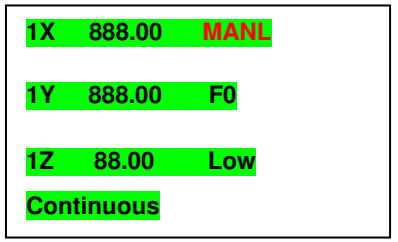
NOTES:

* If a single button is pressed, the function works when it is released.

** If compound button features are required, press the first button and then the second one and release both at the same time.

3.3 Basic Settings and Advanced Settings

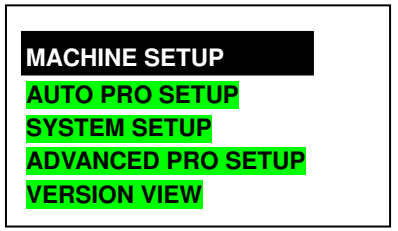
After the **Home Operation***** has been finished, the MO-CON501 controller will be in Manual Mode.



*** For more details of how to do “Home Operation”, please go to the section “***Home Operating***” on Page 8.

The users can change and customise the parameters and settings under the Setup Menu if needed. There are five Setting options in the menu: 1) CNC Machine Setup; 2) Auto-process Setup; 3) System Setup; 4) Advanced Process Setup and 5) software version.

Press HOME 9 to enter the menu and the screen will show the following five setting options:

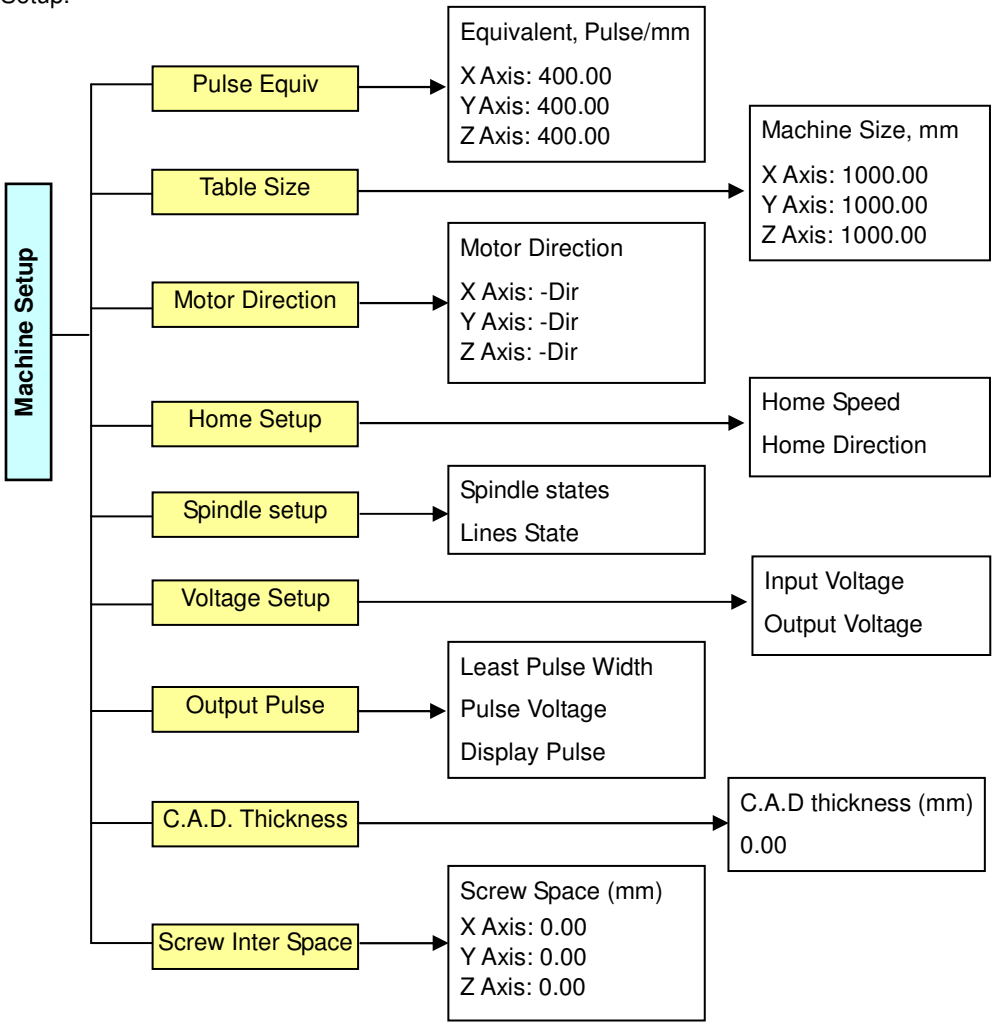


You can switch to different setup options by pressing X− 5▼ or X+ 1▲.

3.3.1 Machine Setup

Machine setup parameters are specific to the machine hardware, such as drivers, I /O terminals. If these parameters are wrong, it will lead to inaccurate movement and even cause damage to the machine or injury to the operators. We strongly recommend machine operators do **NOT** change these settings. If it is necessary to change the settings, please seek advice from an expert before starting it.

The chart below shows nine key fields that Machine setup includes: 1) Pulse Equivalent Setup, 2) Table Size Setup, 3) Motor Direction Setup, 4) Home Setup, 5) Spindle Setup, 6) Voltage Setup, 7) Output Pulse Setup, 8) C.A.D. Thickness Setup and 9) Screw Inner Space Setup.



Pulse Equivalent

Pulse Equivalent means the pulse number to move the axis per 1mm. Its unit is pulse/mm.

Pulse Equivalent= (360degree / Step angle) * (Microstep / Screw pitch)

e.g. (360 / 1.8) * (4/ 5) = 160

When you are in “Pulse Equivalent” Setting, the cursor is on X-axis value. If it is necessary to change it, input the value directly, then press

to save the value. The cursor moves to the next line. If no change is required, press

to exit.

IF THE SETTING OF THE PULSE EQUIVALENT IS WRONG, THE SIZE OF THE FINISHED ARTICLE WILL BE WRONG.

Table Size

Table size refers to the valid movement size of all 3 axes. Because the system uses the table size as a soft limit, you should set the table size just under the size it really is. Otherwise it could crash at the end of table stroke.

When you are in “Table Size” setting, the cursor is on X-axis value. If it is necessary to change it, input the value directly, then press

to save the new value. The cursor moves to the next line. If there is no change required, press

to exit.

If a CNC programme exceeds the table limits, the system will give a warning when it checks the programme. If this occurs, you must change your programme, move your work piece, or use a larger machine.

Motor Direction

Motor Direction refers to the default direction of the motors on each axis. It gives you the option of changing the direction without having to change the wires around.

This affects all other direction options. So if you change this, you may need to reset them.

Press ORIGIN OK to access to this menu; use X+ 1▲ and X− 5▼ to scroll up and down and use Y+ 2^ and Y− 6v to change the direction from **+** to **-**

Home Setup

- ***Home Function***

"Home" is the machine origin. "**Go to home**" refers to moving all axes back to the machine origin. Home position depends on home sensor. Normally there are 3 sensors on a 3-axis machine. "**Go to home**" operation sets up the relationship between the machine and the working co-ordinates. Many system function applications rely on this operation, such as stop point save, power off reboot and so on.

It is good practice to home a machine after switching the power on.

If you enter the menu by pressing MENU −, please press STOP CANCEL to exit and return to MANL as no changes are required here under normal use.

- ***Home Operating***

When the power is turned on, "Go to Home?" appears on the screen: this is a question which will need to be answered by the operator:

Pressing ORIGIN OK *means "Yes"*- the Z axis moves first; when the Z axis arrives at its home position, the X and Y will also move to the home position.

Pressing RUN/PAUSE DELETE *means "No"*- the 3 axes do NOT move to their home positions.

Pressing any other KEY- Only the Z axis moves to home position; X and Y do NOT go home.

When the machine is moving to the home position, you can press the KEY STOP CANCEL to stop "Homing". The controller is now in Manual Mode. Pressing HOME 9 will move the machine to

home when in manual mode.

Pressing XY→0 4 will zero X & Y. Pressing Z→0 8 will zero Z creates an origin point which the pendant controller uses when running a CNC programme.

Pressing ORIGIN OK will move the machine to the origin point for the current working coordinate when in manual mode.

1X 0.000, 1Y 0.000, 1Z 0.000

The MO-CON501 pendant controller can be set for use without the "Home feature" if required.

- ***Two Parameters: Home Speed and Home Direction***

"**Go to home**" parameters include **Home Speed** and **Home Direction.** They can be adjusted in Menu.

Home Speed refers to the speed of 3 axes back to home position. Normally the home speed of the Z axis should be slower than X axis and Y axis.

Home Direction refers to which direction the axes go when moving back to home position. It depends on the motor direction and Home sensor's location.

Entering Menu, cursor is on "Machine Setup" option, press ORIGIN OK to enter the setting. Use X− 5▼ to move the cursor to "Home Setup" option, press ORIGIN OK to enter the sub-menu, the cursor is on "Home Speed" item automatically, press ORIGIN OK to enter and set 3 axes speed, detailed as following:

Home Speed (mm/min)
X Axis: **3000.00**
Y Axis: 3000.00
Z Axis: 3000.00

If you wish to change the settings, press RUN/PAUSE DELETE to delete the existing numbers and then use the number keys to enter the new settings. After finishing, press ORIGIN OK to confirm and save the new settings.

The Cursor will moves to the Y axis, if you wish to keep the Y axis settings, press ORIGIN OK to move to the Z axis. When finishing all settings, it will go back to previous menu.

Press X− 5▼ to move the cursor to "**Home Direction**" item then press ORIGIN OK to enter the setting, it will display as follows:

Set Home Direction	
X Axis:	**-Dir**
Y Axis:	-Dir
Z Axis:	+Dir

The cursor is on X-axis item automatically. Press Y+ 2∧ and Y− 6∨ to change the current setting, press X− 5▼ to move the cursor to next line. Press ORIGIN OK to confirm and save the changes, it will then go back to the previous menu. Pressing STOP CANCEL before you finish, it will cancel the changes and go back to the previous menu.

Spindle Setup

The system offers a spindle speed control function, if the DSP board is connected to an inverter with inputs for this. (A solid state relay can be connected for on/off with no-speed control).

The spindle speed can be changed before or while a programme is running.

Move cursor to "Spindle Setup" item then press ORIGIN OK to enter. Then it shows the value of spindle state, the default value is 2. (On and Off)

If you set this to 4 for example, you would have 4 speeds- Off, On at speed 1, On at speed 2, On at speed 3, these are outputs to the spindle inverter. If you need to change, input the value directly then press ORIGIN OK to save. It will show the line state. Set the lines state according to the inverter. ↓ means output OFF, ↑ means output ON. Press Y+ 2∧ and Y− 6∨ to change property then press X+ 1▲ and X− 5▼ buttons to move the cursor to next line, press ORIGIN OK to confirm all changes. If there is no change required, press STOP CANCEL to exit.

There are a set of four blue led 's on the DSP Board that turn on and off corresponding to the above settings, using a simple binary system this gives you up to 1 6 outputs to control ON/Of f and 15 speeds (this could also be modified to turn a coolant pump ON/OFF).

Spindle Delay: This is a time allowance to let the spindle get up to speed before the CNC programme starts cutting, units are mSec, so the default value of 4000 = four seconds.

Voltage Setup

The default settings are correct for most applications. You do NOT need to change it unless you are using a non-standard setup.

Voltage Setup refers to the terminal properties, which are the I /O sensors working at high or low voltage. Down arrow symbol means it is high voltage, while the up arrow symbol means it is low voltage. It divides to two parts: input voltage and output voltage.

Input Voltage: the front 4 are: X, Y, Z home sensor and C.A.D property.

Press Y+ 2∧ and Y− 6∨ to change its property, and press X+ 1▲ and X− 5▼ buttons to move the cursor to the next line, press ORIGIN OK to confirm all changes. If it does not need to changed, press STOP CANCEL to exit and go back previous menu. It is the same operating mode to the output Voltage if it needs to be changed.

Speed Limits

This is the maximum speed you wish your machine to run at. You can enter different maximum speeds for each axis and direction.

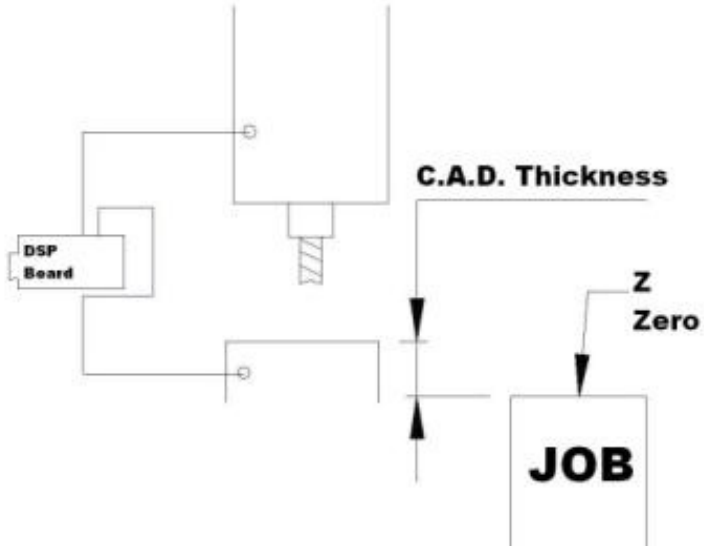
Once set, if a machine operator enters a speed over this limit, the machine will only run at this maximum speed.

C.A.D. Thickness

You must have a physical connection between the machine and the DSP board.

Cutter Adjustment Device (C.A.D.) is used to automatically set the Z axis working origin after a tool change. Users must set its thickness correct to the switch and the setup they are using, otherwise, the Z axis working origin will be incorrect.

The compound key for this feature should NOT be used unless this system is available on the machine and set up correctly. If used by mistake, the stop key STOP CANCEL must be pressed to cancel.



C.A.D. function process needs compound key MENU − + ON/OFF • to start the operation. The Z axis goes down slowly until it reaches the Cutter Adjust Switch. Then it will return to its previous height and set the Z origin allowing for the C.A.D. thickness. After you have used this function, you don't need to set the Z origin manually.

Screw Interspaces

Screw Interspaces refers to the back lash compensation (this is for worn ball screws) if required its value cannot exceed 1mm.

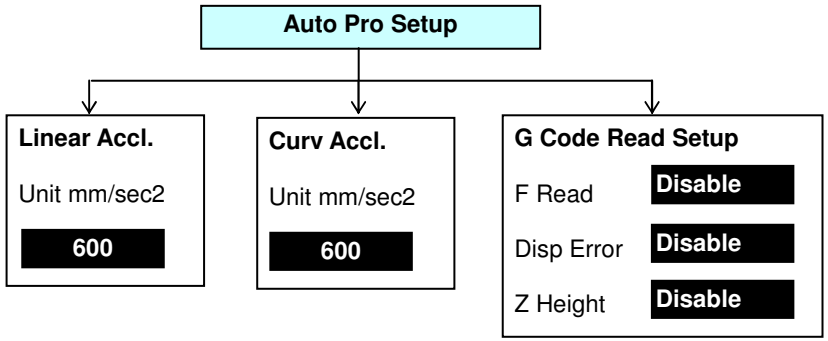
This would be set to zero on a new machine.

Operating Steps are: move cursor to "Screw Interspaces" item, press ORIGIN OK to enter the item, cursor is on X axis value automatically. If you need to change the value, input the value

by pressing the related buttons and then press ORIGIN OK to save the changes, the cursor moves to the next line. If you don't need to change, press STOP CANCEL to exit.

3.3.2 Auto Process (Auto Pro) Setup

Auto Process Setup deals with acceleration and code read properties.



Linear Acceleration

Linear Acceleration promotes the line motion stability. Its default value is 600mm/square second. If it needs the value changed, input the value directly and press ORIGIN OK to save. Then the cursor moves to the next line. If the change is unnecessary, press STOP CANCEL to exit.

If the auto process speed is less than 10 meters /min, the acceleration is about 300-600mm/ sec2; if the speed is more than 10meters /min, you should adjust the acceleration value.

Curve Acceleration

Curve Acceleration promotes the curve motion stability. Its default value is 600mm/ square second. If it needs the value changed, input the value directly and press ORIGIN OK to save. If the change is unnecessary press STOP CANCEL to exit.

If the auto process speed is less than 10 meters /min, the acceleration is about 300-600mm/sec2; if the speed is more than 10 meters/min, you should adjust the acceleration value.

G-Code Read Setup

G-code Read Setup means the rules for reading G code programme. Because there are many special code formats.

Entering the settings, the cursor is on "F Read Disable" item, if you need to read or ignore the F code (feed) in the programme, then press Y+ 2∧ and Y− 6∨ to change its property. "Disable" means to ignore the F code while "Enable" will read and execute the F code. Press X+ 1▲ and X− 5▼ to move the cursor to the next item.

Display Error refers to display the wrong G code file, so that the user can correct it.

Z height refers to the raising of Z axis when the programme has finished running. "Enable" means that Z axis raises to the set height after it finishes running a programme. "Disable" means that Z axis rises at the programme. Press ORIGIN OK to confirm while pressing STOP CANCEL to cancel the changes and exit.

Process Time

This feature calculates the process time and total distance moved of a selected CNC programme. Choose a file from the U disk (USB memory stick) or the internal memory; press

and after calculating, the information will be displayed. Press

to exit.

3.3.3 System Setup

System Setup deals with function configure, file format, I /O checking, buttons check and system update.

Function Setting

Set main function by offering options and asking a series of questions in a sequence.

Power-Off Protection

This function is an option to resume CNC program from a power cut or an emergency stop, press

for “Yes” any other key for “No”.

Set Home Switch

Choose “Enable” if there is a home sensor fitted to the highlighted axis. Press

and

to change between “Enable” and “Disable”. Choose “Disable” if there is no home sensor fitted to the axis.

Go Home types

Go Home Types Refers to when the system is turned on and which mode the system will take.

There are three home operation modes as follows:

- ***Info Go Home*** (recommended)

When the power is turned on, “Go to Home?” appears on the screen: this is a question which will need answering by the operator.

Pressing

means “Yes”- the Z axis moves first; when the Z axis arrives at its home position, the X and Y will also move home.

Pressing

means “No”- the 3 axes do NOT move to their home positions.

Pressing any other KEY- Only the Z axis moves to home, X and Y do NOT go home.

- ***Auto Go Home***

The machine moves home when power is switched on. **(This is not recommended)**

- ***Don’t Go Home***

- When in Manual state, pressing

will send all 3 axes to the home position.

  When the machine is moving to the home position, press the

button to stop the operation. Z axis value changes and saves, Emergency Stop sensor, Hard limits sensors and so on. Press

to enter and select the different function, configure according to the requirements.

Inner Formatting

Inner Formatting Refers to formatting the flash disk (internal memory). Before you start the system update, you can format the inner file.

THIS IS NOT RECOMMENDED AS IT DELETES ALL PROGRAMMES AND SETTING. YOU WILL LOOSE ALL YOUR SETTINGS UNLESS THE DATA IS BACKED UP.

Move the cursor to Inner Format item, and press

, the screen appears as following:

Formatting… …
30%

When it is finished, "formatted" appears and press ORIGIN OK to exit.

Input Self-check

It refers to the system checks Input terminals properties

Output Self-check

It refers to the system checks Output terminals properties

Buttons Check

It refers to check the buttons on the panel. After entering, press the buttons and the related one will show the cursor. If you want to quit, press compound buttons ORIGIN OK + STOP CANCEL

System Auto Update

If you need to update the system, you should download the update file from our website to a USB memory stick. Then insert the USB memory stick in to the MO-CON501 Controller.

Move the cursor to "System Auto Update" item, and press ORIGIN OK. The following screen appears:

Choose file:
U Disk file list
Inner file list

Choose U disk file list, press ORIGIN OK display all files in the U disk, move the cursor to the downloaded update file, press ORIGIN OK to start, the update file info appears on the screen, the user must move the cursor and read all information, then press ORIGIN OK to execute next, the screen displays as following:

It is updating Normal Programme, please wait… 40%

It is updating Initial Programme, please wait… 40%

It is updating English Menu, please wait… 40%

It is updating English Label, please wait… 40%

Updated, press any button to continue…

The press ORIGIN OK to confirm the update.

3.3.4 Advanced Process (Advanced Pro) Setup

Advanced Process Setup refers to special applications which include Multiple Setup, Stop Setup, File Maintenance, Tool Change Setup and Password Setup. This is accessible by pressing the menu key and selecting **Advanced Pro Setup**.

Multiple Setup

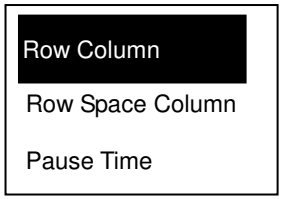
If you need to run the same programme a number of times in an array e.g. 9 times 100mm apart 3 by 3.

You can see the multiple parameters, such as:

Row Column number

Row and column spacing

Pause time



Press ORIGIN OK to enter, the cursor is on the row values. If it needs to be modified, input the value directly. And the cursor moves to column setting. Then press ORIGIN OK to save the change, it will then go back the previous menu. Press X− 5▼ to move the cursor to “Row Space Column Space” item. The cursor will be on Row Space value. If you need to modify, input the value directly, the cursor will move to Column setting. Press ORIGIN OK to save the change and it will go back to the previous menu.

Space means the two centre distances.

Press X− 5▼ to move the cursor to “Pause Time” item, press ORIGIN OK to enter. Pause Time refers to the time between each run. If you enter a negative number, the machine will stop after each run and you will have to press ‘any key’ to continue.

File Maintenance

File includes **U disk file and Inner file.** U disk file refers to files saved on the USB memory stick. The controller can run the file via U disk. Inner file refers to files saved in the controller. File maintenance means you can view the file, Copy file and Delete the file.

View File- This allows you to read the CNC programme on the screen.

Press ORIGIN OK to enter. Press X+ 1▲ and X− 5▼ to scroll the cursor to the target file.

Press ORIGIN OK to select file to be viewed. Use X− 5▼ to scroll down the programme and contents. Press Y+ 2∧ to go to first line while Y− 6∨ to the last line. Press STOP CANCEL to quit view.

Copy File- This allows you to copy programmes from the USB memory stick to the internal memory. Follow onscreen instructions.

Delete File- This will delete the target file. The deleted file can NOT be recovered!

You should select the file name, move the cursor to the target file and press ORIGIN OK to delete.

3.3.5 Version View

Version includes Initial version and Normal version. Move cursor to select and press ORIGIN OK to enter or press STOP CANCEL to quit.

4. HOW TO USE THE CONTROLLER

4.1 Power On

When the power is turned on, “Go to Home?” appears on the screen: this is a question which is answered by the operator.

Pressing ORIGIN OK means “Yes”- the Z axis moves first; when the Z axis arrives at its home position, the X and Y will then move home.

Pressing RUN/PAUSE DELETE means “No”- the 3 axes do not move to their home position.

Pressing any other KEY- ONLY Z axis moves to home, X and Y do not go home.

When the machine is moving to the home position, you can press the KEY STOP CANCEL to stop “Homing”.

Pressing HOME 9 will move the machine to home when in manual mode.

Pressing XY→0 4 will zero X & Y. Pressing Z→0 8 will zero Z creating an origin point

Which the MO-CON501 controller uses when running a CNC program

Pressing ORIGIN OK will move the machine to the origin point for the current working coordinate when in manual mode

1X 0.000, 1Y 0.000, 1Z 0.000

4.2 Working Co-ordinate

Using the compound Keys MENU – + a Number key will switch current working coordinate

i.e. MENU – + Z+ 3 3X 0.000, 3Y 0.000, 3Z 0.000)

4.3 Travel Speed Settings

There are two speed options in manual mode: High speed / Low speed HIGH/LOW 0

To set the low speed, press HIGH/LOW 0 till **“Low”** appears on the screen then press STOP CANCEL. A menu will appear with the current low speed figure displayed. If you wish to change the value, use X+ 1▲ and X− 5▼ to scroll up and down then press RUN/PAUSE DELETE and enter the new speed value with the number keys. Press ORIGIN OK to confirm the change. You can also set the low step distance on this menu (Low grid). Press STOP CANCEL again to exit.

To set up the high speed, press HIGH/LOW 0 till **“High”** appears and repeat the steps as above.

4.4 Moving In Manual Mode

There are three modes of movement. Pressing MODE will rotate through the modes:

Continuous

Step

Dist ******

When **“Continuous”** is displayed, pressing X+ 1▲, X− 5▼, Y+ 2∧, Y− 6∨, Z+ 3

And Z− 7 will move the machine in the appropriate direction at High or Low speed depending on HIGH/LOW 0 selection.

When **“step”** is displayed, pressing X+ 1▲, X− 5▼, Y+ 2∧, Y− 6∨, Z+ 3 and Z− 7 will move the machine in a step defined by the setting (0.1mm- Low; 0.5mm High).

When **"Dist"** is displayed, you have an option of entering a distance by using the number key. Press ORIGIN OK to confirm. Then when pressing X+ 1▲, X− 5▼, Y+ 2∧, Y− 6∨, Z+ 3 and Z− 7, the machine will be move the distance value entered every time. Press STOP CANCEL to stop a Dist move.

For safety purpose, do **NOT** have the Dist Mode displayed when NOT required. Otherwise, the machine would move a distance if a key is pressed by mistake.

At any point, you can use XY→0 4 and Z→0 8 to zero the axis's

By using the features above, you can set a cutter to a work piece and create origin points for any CNC programme you wish to run. You can move away from this point as any CNC programme will still use this origin point.

4.5 Spindle Control

In manual mode, pressing ON/OFF • will turn the spindle ON / OFF, providing it has a connection to the DSP card.

S OFF

S-ON is displayed.

If the DSP is connected to an inverter with an input for spindle speed control, you can use the compound key to change the spindle speed when it is running in manual mode as follows:

With the spindle running, press ON/OFF • + Z+ 3 and release them together to increase the speed and press ON/OFF • + Z− 7 to decrease the speed.

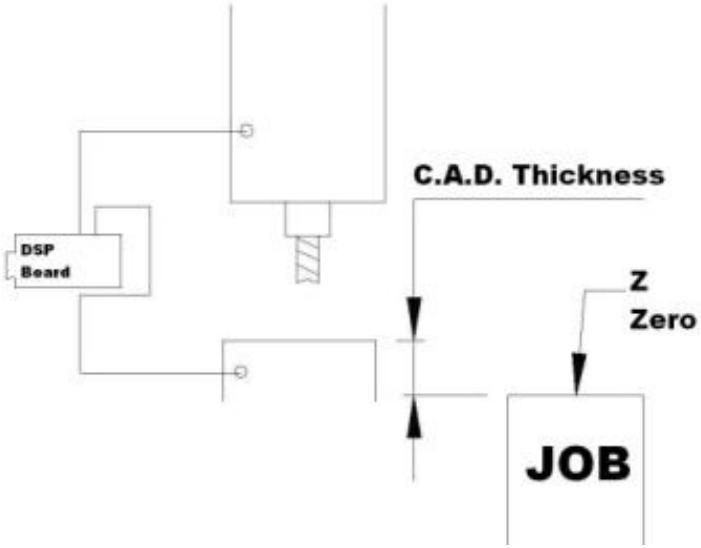
When running a CNC programme (RUN), you only need to use Z+ 3 and Z− 7 to change the spindle speed on the fly.

4.6 Cutting Adjustment Device (C.A.D.)

You must have physical connection between the machine and DSP board.

Cutter Adjustment Device (C.A.D.) is used to automatically set Z axis working origin after a tool change. Users must set its thickness correct to the switch and setup they are using, otherwise, the Z axis working origin will be incorrect.

The compound key for this feature should NOT be used unless this system is available on the machine and set up correctly. If used by mistake, the stop key STOP CANCEL must be pressed to cancel.



C.A.D. function process needs compound keys [MENU −] + [ON/OFF •] to start the operation. Then the Z axis runs down slowly. When it reaches the Cutter Adjust Switch, it will return to its previous height and set the Z origin allowing for the C.A.D. thickness. After you have used this function, you don't need to set Z origin manually.

4.7 Running a CNC programme

Once an origin point has been set with the current cutting tool, you are ready to run a CNC programme. The programme will use the current working co-ordinate (origin).

Press [RUN/PAUSE DELETE] to open **"Choose file:"**, select **"U Disk File"** (USB memory stick) or **"Inner File"**. Using the [X+ 1▲], [X− 5▼] to scroll up or down. Press [ORIGIN OK] to open file location.

Scroll to select CNC programme by file name and press [ORIGIN OK] to open **Auto Process Menu**:

You can change these parameters before the CNC programme starts or while it is running (except ZDownRat).

Proc Spd is the speed the machine cuts in M/min (cutting feed G1)

Trvl Spd is the speed the machine moves when not cutting, in M/min (Rapid moves between cuts G0)

ZDownRat is to protect the point of a cutting tool by plunging in at a slower feed rate if set to 0.5 if will be half of the **Proc Spd** and so on.

Spd Rati works as a feed override so if set to 0.25 then machine feed will run at one quarter of the **Proc Spd** entered and so on

(This is a useful feature because you can start the CNC programme at a slow speed and then ramp it up to full speed if it looks OK)

Spd Grad: this is used to set up the spindle speed, if the DSP is connected to a spindle inverter.

The rest of the auto poses menu is for reference and can NOT be changed.

To change the above parameters, scroll up or down by using [X+ 1▲] [X− 5▼] then press [RUN/PAUSE DELETE] and enter new parameters by using the number keys. After finishing the modification, press [ORIGIN OK] to confirm the change. A second press or press [ORIGIN OK] without pressing [RUN/PAUSE DELETE] first will start the CNC programme (the changes will be remembered for the next run).

There will be a four-second time delay to allow the spindle to get up to speed at this point you are asked to press [STOP CANCEL] if the spindle doesn't start.

4.8 Running a Machine

The machine should now be running the CNC programme. To pause and keep the spindle rotating, press [RUN/PAUSE DELETE]. The machines will slow down and stop all axis movements. Press [RUN/PAUSE DELETE] again to restart.

You can adjust the Z origin when paused (This is **NOT** recommended)

To stop a CNC programme before completion, press STOP CANCEL and the machine will stop instantly and turn the spindle off. You get the opportunity to save a resume point at this time. Save Stop Pt?

Press a number key to store the resume point under then press ORIGIN OK. The machine will move up in the Z axis and move back to the origin X Y Zero.

4.9 Resume Machining

If you wish to resume machining from a resume point, you use the compound keys as follows:

Press and hold down RUN/PAUSE DELETE, then press and hold the number key you saved from the resume point. Release those two keys together and the Auto process menu will open. Press ORIGIN OK and the line of the programme will be displayed. Press ORIGIN OK again, the CNC programme will now start from this point.

4.10 Changing the Feed and Speed On the Fly

When a CNC programme is running (RUN), you can use the Z+ 3, Z- 7 keys to change the spindle speed on the fly, given the DSP is connected to a spindle inverter.

As the programme runs, the menu displays in rotation:

Spd Rati

Speed m/min

Line No.

To stop the rotation of the menu, press MODE, a number of times to constantly display the required item. To adjust the value of Spd Rati as a CNC programme is running, use Y+ 2∧, Y- 6∨ keys (this is feed override).

4.11 Advanced Process

Advanced process is the function for special applications including **Segment Process, Multiple Process, Segment-multiple Process, Mill Table, Tool Change**.

Press together and release the compound buttons RUN/PAUSE DELETE + HIGH/LOW 0, the following menu will appear:

Advanced Process:

Segment Process

Multiple Process
Segment-Multiple
Auto Copy Process
Mill Table
Tools Change

4.11.1 Segment Process

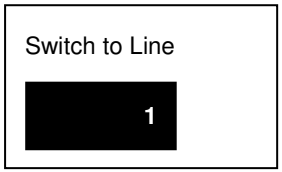
Segment Process is an option to run a CNC programme from a specific line number to a specific line number.

Press ORIGIN OK to enter the setting. Press X+ 1▲ and X- 5▼ to move the cursor to a file

location. Press ORIGIN OK to enter the file list, press X+ 1▲ and X− 5▼ to select the target file.

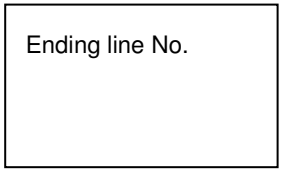
Press Y+ 2∧ to select the 1st line and Y− 6∨ to select the last line

The first G code data displays on the screen. Press RUN/PAUSE DELETE and the following is displayed:



Input the line number in cursor position. Press ORIGIN OK to confirm beginning line number.

G code data is displayed for this line number. Press ORIGIN OK and the following is displayed:



Press RUN/PAUSE DELETE twice and input the ending line number in cursor. Press ORIGIN OK to confirm ending line number. Press ORIGIN OK again to run CNC programme segment.

4.11.2 Multiple Process

Multiple process is an option to run a CNC programme a number of times in an array. Parameters are set in Advanced Pro Setup.

For details, see ***MO-CON501 Pendant Controller Setup Guide*** page 22.

Operating steps are:

Press ORIGIN OK to enter setting, press X+ 1▲ and X− 5▼ to move cursor to file location.

Press ORIGIN OK to enter the file list, press X+ 1▲ and X− 5▼ to select the target file.

Press ORIGIN OK again to run CNC programme.

4.11.3 Segment-multiple Process

Segment-multiple Process is an option to run a CNC programme from a specific line number to a line number a number of times in an array. Its operating steps are the same to **Multiple Process**.

4.11.4 Mill Table

Mill Table is an option to machine a rectangular area to a specified depth without the need for a CNC programme.

Press ORIGIN OK to choose "bottom to top" or "left to right" then press ORIGIN OK

Set process speed

Size of horizontal cuts

Size of vertical cuts

Width X axis

Length Y axis

Depth Z axis

Press

to run the programme.

4.11.5 Tools Change

Do NOT use this unless there is an option for it in the main menu

If supported after having set the tool change position in the menu, selecting this item, the machine will then go to the set position and wait for the change of tool.

APPENDIX

TWELVE MONTH LIMITED WARRANTY

Motion Control Products Ltd. warrants its products against defects in materials and workmanship for a period of 12 months from the shipping date. During the warranty period, Motion Control Products will either, at its option, repair or replace products which are proved to be defective.

EXCLUSIONS

The above warranty shall not apply to defects resulting from: improper or inadequate handling by the customer; improper or inadequate customer wiring; unauthorised modification or misuse; or operation beyond the electrical specifications of the product and/or operation beyond environmental specifications for the product.

SHIPPING FAILED PRODUCT & OBTAINING WARRANTY SERVICE

If your product should fail during the warranty and you want to obtain warranty service, a RMA (returned material authorisation number) request form must be filled in on our website http://www.motioncontrolproducts.com/pages/returns.php before returning the product for service. Please include a written description of the problem along with contact name and address. Customer shall prepay shipping charges returned to Motion Control Products for warranty service, and Motion Control Products shall pay for return of products to the customer, providing the fault is not caused by the customer. Send the failed product to your distributor for your area or to **Motion Control Products Limited**, 11-15 Francis Avenue, Bournemouth, Dorset, BH11 8NX, UK. Also enclose information regarding the circumstances prior to the product failure. For full terms and conditions of Warranty and Returns Policy, please refer to our website http://www.motioncontrolproducts.com/pages/returns.php

WARRANTY LIMITATIONS

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